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QUARTERLY STATUS REPORT

12 December 1963 - 11 March 1964

Task Order Contract NASr-21(07)

(Principal Investigator: Y. H. Katz)

UNPUBLISHED PRELIMINARY DATA

RAND work under this Task Order Contract comprises basic studies relating to the scientific utilization of meteorological satellite data and the implications of new techniques and measurements to meteorological satellite development.

Description of Progress

1. We have completed the data reduction transformations of our cloud pattern samples and are analyzing the derived cloud statistics and extractions of pattern features for their significance, viz., the coherence of the measurements within each pattern class and the variation between classes.

The first report on our research in pattern recognition will be forwarded to NASA shortly. A second report detailing the results of our data reduction and feature extraction programs will follow during the next quarter.

We have begun a survey of recent trends and current progress in automatic pattern recognition in order to evaluate its possible future operational and research role in meteorological satellite activities.

2. A report on the feasibility of determining high-altitude water vapor from a satellite was forwarded to NASA Headquarters.

The first of a series of reports relating to our survey of the electromagnetic spectrum, and covering the middle ultraviolet and vacuum ultraviolet portion of the spectrum, was forwarded to NASA Headquarters. Another report by W. W. Kellogg, on a study of infrared applications for meteorological satellites, is in preparation.

3. The two-layer primitive equation model developed by Mintz and others at UCLA for the study of the earth's general circulation is being modified for application to the circulation on Mars. The most important changes relate to the incorporation of different methods for calculating radiative and sub-grid scale convective heat transfer

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and sub-grid scale momentum transfer. Divine's model of radiative transfer by CO_2 (assumed to be the only radiatively active gas) is being incorporated into the program. The magnitude of the heat exchange process between the Martian ground and atmosphere has been roughly estimated from the observed diurnal temperature variation of the Martian surface. Other important differences between the calculations for Mars and Earth will include an assigned finite heat capacity for the Martian surface (estimated from the diurnal temperature variation), and a diurnal variation in heating.

Problems Impeding Progress

We are waiting for permission to release a report forwarded to NASA Headquarters in February 1964. (See under Reports.)

Future Work

The studies noted in Items 1, 2, and 3 above are being continued.

Reports

1. RM-3412-NASA, Automatic Pattern Recognition of Meteorological Satellite Cloud Photography, W. L. Doyle, Y. H. Katz (in preparation).

2. RM- -NASA, Infrared Applications for Meteorological Satellites (Part II of an Examination of the Application to Satellite Meteorology of Various Segments of the Electromagnetic Spectrum), W. W. Kellogg (in preparation).

3. RM-3950-NASA, Ultraviolet Spectroscopy of the Upper Atmosphere (Part I of an Examination of the Application to Satellite Meteorology of Various Segments of the Electromagnetic Spectrum), R. O. Hundley, December 1963. (Distribution approval not received from NASA until 7 April 1964.)

4. RM-3986-NASA, The Satellite Determination of High-Altitude Water Vapor, E. C. May, A. B. Kahle, February 1964. (Approval of our proposed distribution not received from NASA as of 9 April 1964.)

Personnel

The following scientific personnel were active during the reporting period: W. L. Doyle, R. O. Hundley, Y. H. Katz, W. W. Kellogg, C. B. Leovy, Y. Mintz (Consultant), K. J. K. Buettner (Consultant).